Instructors: Dr. Chris Palmer, Chem Bldg 203A, christopher.palmer@umontana.edu  
Dr. Lu Hu, Chem Bldg 013A, Lu.hu@mso.umt.edu

Office hours: Mon. and Wed. 1-3 and by appointment.

Texts: No text is required for this course. We will take material from: 
Principles of Environmental Chemistry, James E. Girard, Jones and Bartlett, 2005; 
Introduction to Atmospheric Chemistry, Daniel J. Jacob, 2002.

We will also use information from published papers, and will give you the citations and post the manuscripts to Moodle when we do.

Learning Outcomes: Environmental Chemistry is a vast and broad topic that includes the chemistries of land, water and air, and the interaction of chemicals with plants and animals (including humans) in the environment. A one semester course can not cover all of the topics in any real detail. Instead, this course will give an overview of important chemistries of the earth, water and air. The course will present natural chemical processes in the environment and use specific examples of anthropogenic impacts on the chemistry of the environment. The purpose of this course is to 1) establish an understanding and appreciation of environmental chemical processes and their complexities, 2) develop a working knowledge of the chemistry involved in specific environmental challenges, 3) develop a familiarity with commonly used measurement techniques and information available for the study of environmental chemistry, and 4) provide a familiarity with current research in environmental chemistry. Having completed this course, the student should be able to read the literature describing studies of environmental chemistry and should be better prepared for more in-depth studies of specific environmental chemistries (e.g. atmospheric chemistry).

Background: It is assumed that students have an undergraduate level knowledge of physical chemistry (thermodynamics and kinetics) as well as a familiarity with chemical names, structures and notations, chemical reactions and stoichiometry, and chemical reactivity. Students should have a working knowledge of equilibrium chemistry, and acids and bases. Students are also expected to have a basic working knowledge and understanding of spectroscopy.

Course Organization: Approximately the first three fourths of the semester will be taught in the traditional lecture format. During this period, the fundamentals of various areas of environmental chemistry will be covered, along with examples of the chemistry of specific environmental issues. During this period there will be a written exam. The final few weeks of the semester will be used for invited lectures from local researchers conducting research in environmental chemistry. Students will write a ~ ten page paper on a topic of current interest in
environmental chemistry. This could take the form of a critical review of a current paper from the literature considering related published works. Or, it could take the form of a literature review of a topic of interest. There will be a comprehensive final exam covering the fundamentals and specifics of the research presentations.

**Grading:** Grades will be on the +/- scale (A,A-,B+, etc) with the following breakdown:

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<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
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<tr>
<td>Midterm Exam</td>
<td>20%</td>
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<tr>
<td>Homework Questions and Problems</td>
<td>15%</td>
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<tr>
<td>Preparation and Participation in Discussions</td>
<td>15%</td>
</tr>
<tr>
<td>Final Exam</td>
<td>20%</td>
</tr>
<tr>
<td>Research Paper</td>
<td>30%</td>
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</tbody>
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**Academic misconduct** is subject to an academic penalty by the course instructor and/or disciplinary sanction by the University. Academic misconduct is defined as all forms of academic dishonesty. All of the academic policies found in the Student Conduct Code ([http://life.umt.edu/vpsa/student_conduct.php](http://life.umt.edu/vpsa/student_conduct.php)) apply to this course.

Of particular relevance to this course, it is considered academic misconduct to represent another person's words, ideas, data, or materials as one's own. It is also considered academic misconduct to copy from another student's paper, consult unauthorized material, give information to another student or collaborate with one or more students during an examination or academic exercise without the instructor's permission.

**Students with Disabilities**

If you are a student with a disability and wish to discuss reasonable modifications for this course, contact me privately to discuss the specific modifications you wish to request. Please be advised I may request that you provide a letter from Disability Services for Students verifying your right to reasonable modifications. If you have not yet contacted Disability Services, located in Lommasson Center 154, please do so in order to verify your disability and to coordinate your reasonable modifications. For more information, visit the Disability Services website at [http://www.umt.edu/disability](http://www.umt.edu/disability).

**Important Dates** Important dates and deadlines regarding registration for the fall semester can be found at [http://www.umt.edu/registrar/PDF/OfficialDatesDeadlinesSpring2017.pdf](http://www.umt.edu/registrar/PDF/OfficialDatesDeadlinesSpring2017.pdf)
Lecture Schedule:

Jan 25-Feb. 1: Introduction and overview, Relevant chemical concepts, Cycles

Part I: The Lithosphere
Feb 3: Chemical composition of earth and soils
Feb 8-10: Agriculture and mineral resource development

Part II: The Atmosphere
Feb. 15: Layers of the atmosphere and their chemical composition
Feb. 17-24: Photochemical smog and particulate matter
Mar. 1-Mar. 8: Greenhouse gasses and climate change
Mar. 10-15: Ozone depletion and the ozone holes

Midterm Exam, March 17

Mar. 20-24: Spring Break

Part III: The Hydrosphere
Mar. 29-Apr 5: Chemistry of Natural Waters: pH and Redox Chemistry
Apr. 7-12: Water pollution: Nutrients, Acid rain, Acid mine Drainage.
Apr 14-19: Water Treatment and management of water resources

Part IV: Special Topics TBA
Apr 21:
Apr 26:
Apr 28:
May 3:
May 5: Papers due.

Final Exam: Wednesday May 10, 10:10 AM